

SECTION 02310 – HORIZONTAL DIRECTIONAL DRILLING

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

The CONTRACTOR shall provide all investigation, planning, geotechnical work, equipment, labor, etc. necessary to properly install the proposed directional bores as indicated in the construction plans by using horizontal directional drilling (directional boring) technology. Pipe materials shall match those indicated on the plans.

1.2 SUBMITTALS

Shop drawings and manufacturer's literature shall be submitted to the WPWD for approval.

PART 2 – PRODUCTS

2.1 PRESSURE PIPE AND FITTINGS FOR HORIZONTAL DIRECTIONAL DRILLING

A. Ductile iron pipe for horizontal directional drilling

1. Ductile Iron Pipe for horizontal directional drilling shall be boltless flexible joint pipe and restrained as approved by the WPWD.
2. Ductile Iron Pipe material shall meet the minimum requirements of WPWD Standards Section 02660, 02731, and 02732. Additionally, the joints shall meet the requirements of ANSI/AWWA C111/A21.11.
3. Approved manufacturers include the American Cast Iron Pipe Company and Griffin Pipe Products Company or other as approved by WPWD.

B. Polyvinyl chloride pipe (PVC) for horizontal directional drilling

1. Products delivered under this specification shall be manufactured only from water distribution pipe and couplings conforming to AWWA C900 or AWWA C905, as appropriate for the size of the water main indicated on the plans. Pipe materials and joints shall be rated for 250 psi or greater.
2. Pipe and couplings shall be made from unplasticized PVC compounds having a minimum cell classification of 12454-B, as defined in ASTM

D1784. Pipe, couplings, and locking splines shall be completely non-metallic. The compound shall qualify for a Hydrostatic Design Basis (HDB) of 4000 psi for water at 73.4°F, in accordance with the requirements of ASTM D2837.

3. Pipe shall be joined using non-metallic couplings to form an integral system for maximum reliability and interchangeability. High-strength, flexible thermoplastic splines shall be inserted into mating, precision-machined grooves in the pipe and coupling to provide full 360° restraint with evenly distributed loading.
4. Couplings shall be designed for use at or above the rated pressures of the pipe with which they are utilized, and shall incorporate twin elastomeric sealing gaskets meeting the requirements of ASTM F477. Joints shall be designed to meet the leakage test requirements of ASTM D3139.
5. Approved manufacturer includes C900/RJ™ PVC restrained-joint pipe or C905/RJ™ PVC restrained-joint pipe from CertainTeed Corporation and any other manufacturer approved by the WPWD.

C. High-density polyethylene (HDPE) for horizontal directional drilling

1. Pipes: HDPE force main pipe shall meet the requirements for Type III, Grade P345 Polyethylene Material as defined in ASTM D1248 (PE 3408). The minimum pressure class/SDR rating acceptable shall be Class 200/SDR 11. The pipe shall be ductile iron pipe size (DIPS).
2. Joints: Joints shall be of a heat fusion joining system. Pipe and fittings shall be thermal butt fusion, saddle fusion, or socket fusion in accordance with manufacturer recommended procedures and ASTM D2161. At the point of fusion, the outside diameter and minimum wall thickness of the fitting shall match the outside diameter and minimum wall thickness specifications of ASTM D1248 for the same size pipe.

Joining of the pipes and fittings shall be performed in accordance with ASTM D2774. Depending upon the installation requirements and site location, joining shall be performed within or outside the excavation. Joints of the pipe sections shall be smooth on the inside and internal projection beads shall not be greater than 3/16 inch.

The tensile strength at yield of the butt-fusion joints shall not be less than the pipe. A specimen of the pipe cut across the butt-fusion joints shall be tested in accordance with ASTM D638.

The manufacturer shall provide fusion training. The contractor and the

onsite joint inspector shall be trained by the manufacturer or manufacturer's authorized representative.

The fusion equipment and operator shall be required to demonstrate successful field experience. Regarding fusion over 36" capability, the fusion unit shall be field tested for a period of five years and the fusion operator shall have pipe size experience of the same size pipe on this project for five years or longer.

3. Fittings: All fitting shall be provided as indicated on the plans. HDPE Fittings shall be of the same material and class as the pipe and shall be manufactured by the manufacturer of the pipe. HDPE elbows, tees, and wyes shall be manufactured by mitered fabrication. The manufacturer shall have a written specification for all standard mitered fittings, which establishes Quality Control criteria and tolerances. The manufacturer may be required to demonstrate its ability to produce product required by this specification.

Mechanical joint anchor fittings (MJ Adapter or Harvey Adapter) shall be used to transition from ductile iron to HDPE and from HDPE to PVC. The fitting shall be stronger than the pipe in that when it is subjected to tensile stress the pipe will pull apart before the fitting will pull out and the pipe will blow before the fitting will rupture under pressure.

The MJ Adapter shall have a pre-installed stainless steel stiffener, in accordance with Plastic Pipe Institute (PPI) recommendations, to neutralize point-loading, ACQ, creep, and loss of gasket seal due to diameter contraction. The stiffener shall be engineered sufficiently thick to avoid radial buckling due to gasket pressure.

The MJ Adapter requires longer bolts and shall be sold with the modified longer bolt kit to avoid construction crew delays or improper installation with bolts that are too short.

All fittings for force mains or pressure rated fittings shall be rated according to the manufacturer's written specifications, and clearly labeled on the fittings as such.

4. Installation: The installation shall conform to the requirements of the manufacturer, the AWWA Standard, and as indicated on the plans and specified herein.
5. Marking and Certification: Each length of HDPE water main and sanitary sewer shall be clearly marked with the Manufacturer's Name, Trade name or Trademark, Nominal pipe size, Pipe Stiffness,

Production Code/Extrusion Code, Material Cell Class Designation, and ASTM number. HDPE pipe shall have permanently extruded stripes on three (3) or four (4) sides according to the following schedule:

Water Main: Blue Stripes
Sanitary Sewer: Green Stripes

The pipe manufacturer shall provide certification that the stress regression testing has been performed on the specific product. The said certification shall include a stress live curve per ASTM D2837. The stress regression testing shall have been performed in accordance with ASTM D2837, and the manufacturer shall provide a product supplying a minimum Hydrostatic Design Basis of 1,600 psi as determined by ASTM D2837. This certification shall also state that the pipe was manufactured from one specific resin in compliance with these specifications. The certificate shall state the specific resin used and its source.

PART 3 – EXECUTION

3.1 MATERIALS

- A. Piping and conduits installed by horizontal directional drilling (directionally bore) shall be HDPE, PVC or DI as indicated in the plans and other sections of these specifications.

3.2 INSTALLATION

- A. Depths of all existing utilities must be confirmed by the CONTRACTOR prior to the crossing to avoid conflicts. Equipment shall be utilized that does not require the conventional bore and receiving pits due to space constraints. Proper connection to the piping at each end shall be done by standard excavation. The CONTRACTOR shall be responsible to provide a slurry containment pit and shall remove all excess material and dispose of appropriately off-site upon completion. All erosion control facilities shall be provided to contain any solids from migrating beyond the project site. If the CONTRACTOR utilizes a subcontractor for this work, they shall provide proof of adequate comprehensive general liability insurance covering underground collapse and explosion and experience to the ENGINEER and OWNER for prior approval. The CONTRACTOR shall be required to provide all necessary water in accordance with other applicable sections of these specifications. Excavated areas for utility confirmation shall be properly backfilled per Section 02222.

- B. In all cases the manufacturer's recommendations and procedures shall be followed regarding the installation of their pipe material by horizontal directional drilling.
- C. Subsurface investigation, if deemed necessary, shall be provided prior to bids by the CONTRACTOR. No additional payments will be made if rock is encountered or if soil conditions require additional construction time and equipment. Proper equipment and methods shall be used in rock and soil bores to insure proper grades, elevations and separations.
- D. All directional drilling operations shall be performed by a qualified directional drilling CONTRACTOR with at least (3) years experience involving work of a similar nature to the work required of this project. The CONTRACTOR must have installed a minimum of 10,000 linear feet of pipe (4-inch diameter or greater) using directional drilling operations. A list of project references and proof of contractor experience shall be presented to the ENGINEER, upon request by the ENGINEER.
- E. The requirements of all applicable local and state authorities shall be followed by the CONTRACTOR.
- F. The piping shall be installed at the minimum depths indicated in the plans and shall deviate no more than six inches along the vertical axis and 2' along the horizontal alignment.
- G. During installation of all pipes, a minimum of three, 10 gauge, locator wires shall be used.
- H. All pipes installed by the boring method shall be televised with copies given to WPWD Inspector.
- I. The CONTRACTOR shall provide accurate As-Built data based on downhole survey data or a walkover location system that indicates x, y and z coordinates of the pipe at least every thirty (30) feet along the alignment or at a midpoint if the bore length is less than thirty (30) feet.

END OF SECTION 02310